

Radiation Hardened Turbo Coded OFDM Modulator, Phase I

Completed Technology Project (2005 - 2005)



Project Introduction

Space Micro Inc. proposes to develop an innovative Turbo-Coded Orthogonal Frequency Division Modulation (TC-OFDM) ASIC device. The proposed device provides data transmission at very high data rates (1 ? 10 Gbps), with high bandwidth efficiency (up to 8 bps/Hz), and with excellent bit error rate (BER) performance at signal-to-noise ratios approaching Shannon's theoretical channel capacity limit. The TC-OFDM modulator is programmable so that a single ASIC device can support a wide variety of communication links, with different data rates, FEC code rates, and RF channel bandwidths. The modulator also supports dynamic adaptation of FEC code rate and modulation during operation, to maximize data transmission in systems with time-varying communication link conditions. The proposed TC-OFDM modulator is radiation hardened for operation on spacecraft and high altitude airborne platforms. The end result of the proposed SBIR program is innovative TC-OFDM communication link technology and components that will enable greatly increased data transmission rates from space-to-space and space-to-ground, to meet the needs of future NASA earth science missions.

Anticipated Benefits

The technology developed under this SBIR is directly applicable to other commercial systems, including: very high data rate telemetry systems (both line-of-sight and space-based), line-of-sight microwave links for telecommunications, and foreign government space systems. There are also non-NASA applications in the U.S. Government DoD, including the transformational satellite (TSAT) RF downlinks, and data transmission from other reconnaissance satellites and aircraft. The proposed TC-OFDM modulation scheme will increase the data transmission capacity for NASA's near-earth missions by more than a factor of 10 as compared to existing systems. The TC-OFDM modulator device that is developed under this SBIR program can be used directly on a variety of future NASA Earth Science platforms, including the next generation TDRSS spacecraft, LEO/MEO earth science satellites, and high altitude airborne platforms such as drones and balloons, as well as manned aircraft.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

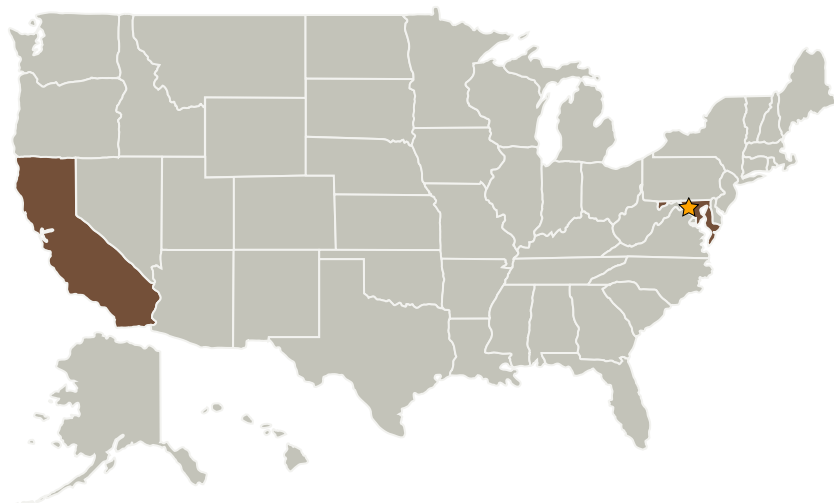
Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Space Micro, Inc.	Supporting Organization	Industry	San Diego, California

Primary U.S. Work Locations

California	Maryland
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Jason A Soloff

Principal Investigator:

Peter Nolan

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
 - └ TX02.1 Avionics Component Technologies
 - └ TX02.1.7 Point-of-Load Power Converters